



# Cryocoolers Cool Infrared Sensors to Enable Space Intelligence, Surveillance, Reconnaissance and Situational Awareness

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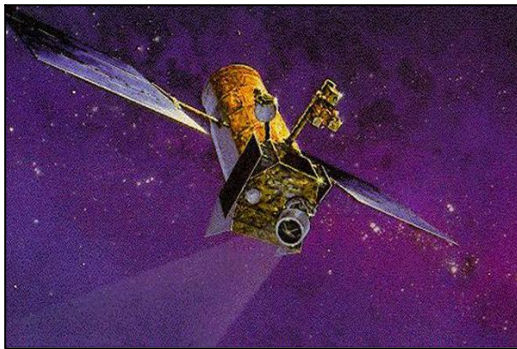
Space Vehicles Directorate

Air Force Research Laboratory

FACT SHEET

## SATELLITE APPLICATIONS

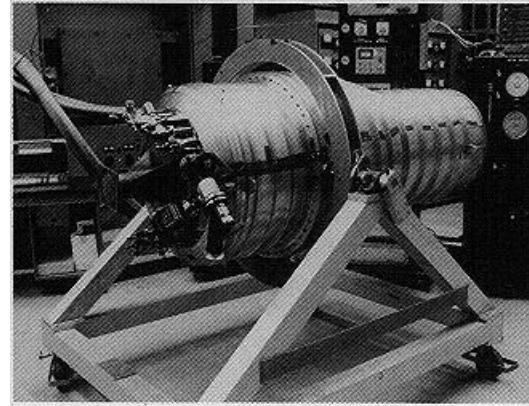
The Air Force is looking for a few good refrigerators. Well, not exactly. In its quest to develop cryogenic refrigeration technology for satellites that enables the performance of onboard infrared sensors to enhance missile detection, conduct intelligence gathering, and enable space situational awareness, the Space Vehicles Directorate conducts cryocooler research.



Cryocoolers are small, simple refrigerators that operate at very low temperatures. Mechanically, they compress and expand a gas – usually helium, which lowers the temperature of critical payload elements such as sensors. For example, for space-based sensors to work, they must function in a cold environment to properly contrast and accurately identify distant objects in space or on the ground through their heat signatures, or spectral “fingerprints.”



## PAST Dewar



< 1 yr. life	SHORT LIFE
> 1000 lbs.	HEAVY
< 0.5 W cooling	LIMITED COOLING

## FUTURE Cryocooler



<10 yr. life	LIFE LONG
< 5 kg.	LIGHTWEIGHT
0.1-20 W	EXTENDED COOLING

*Current as of February 2006*